

## Description

## MEANS OF PERSONAL TRANSPORT

## 5 TECHNICAL FIELD

The present invention relates to vehicles and more specifically to scooters.

## BACKGROUND

10 The scooters of prior art are generally not well adapted to situations where conventional use (propulsion by kicking) is not acceptable or impossible. In addition, scooters are not very well adapted to the need for transportation of goods which often accompanies  
15 personal transportation.

The traditional scooter must often be carried in situations where it can not be used, e.g. during travel by public transport. Even though many scooters have a compact design, such transport by carrying is  
20 impractical.

Several examples of collapsible, wheeled devices are known. One example of a collapsible, wheeled device is disclosed in U.S. Pat. No. 3,434,558. The device is collapsible in that a pair of wheels of the  
25 device can be pushed towards a third wheel guided by a stabilizing sway bar. The device is collapsed by use of both hands, and the design of the stabilizing sway and the platform makes it difficult to transport this vehicle in a collapsed situation.

30 EP 1213214A2 discloses a collapsible tricycle of which the framework mainly comprises tubes. Furthermore, the scooter is folded together with a folding mechanism disposed between the different tube members. The folding mechanisms are relatively complex  
35 constructions which comprise several small parts.

U.S. Pat. No. 6,220,612 also discloses a foldable tricycle. This tricycle is folded together by lowering the front part via a joint located at the connection between the rear and the front part of the cycle, leaving the tricycle in a collapsed position with all parts in substantially one plane with the front and the rear wheels at each end.

DE 3537522 A1 discloses a scooter in which the steering rod may be folded down onto the main structure of the device comprising a platform and wheels.

A foldable tricycle is also disclosed in DE 3138095 A1. This tricycle includes three wheels and may be folded together and transported on the wheels in a collapsed position. The described design requires that the platform is divided and can be folded. The folding of the tricycle is done using both hands. Further the tricycle is free to roll on the wheels in a folded position which is a disadvantage when the device is left unattended on a sidewalk or the like.

One feature missing in these prior devices is a scooter including three wheels which can be folded using one hand only.

A second useful feature would be a scooter which can be carried or wheeled in a folded position like a wheeled suitcase. Compartment units may be attached to the handlebar construction as to make the scooter work like a wheeled suitcase.

A third useful feature would be a scooter which may be left unattended without the risk of the folded scooter moving unintentionally.

A fourth useful feature would be to provide a scooter which has a rigid platform construction.

A fifth useful feature would be to provide a scooter which accommodates motorized propulsion.

# SUMMARY OF THE INVENTION

The embodiments of the invention include a scooter including a support device holding a steerable front wheel. A rear carriage is connected to the support device at the front of the carriage. This rear carriage is provided with at least one wheel at the rear. The rear carriage may be folded against the support device forming a compact unit which may be carried or rolled. In a utilizing position, the front of said carriage rests against a stop face connected to the support device. A rigid stay is pivotally connected at its first end to a mid-section of the carriage and is pivotally connected at its second end to the support device. When the scooter is collapsed, the carriage will pivot around the first end of the stay, and the rear wheel or wheels is swung towards the front wheel. Further advantageous embodiments of the invention will be disclosed below.

The invention relates to a technical solution where a vehicle for personal transport (corresponding to a traditional scooter) may be transformed into a compact and trolley-like compartment unit (corresponding to a traditional suitcase with wheels) which may be handled and is acceptable outside the intended field of application for a scooter.

In one embodiment disclosed in the present application, the vehicle comprises three wheels, which makes it possible for a rider to have a stable ride at low velocity. Corresponding two-wheeled scooters will be more unstable at low velocity.

The invention may function as a hybrid, hence, as a compartment unit (briefcase, suitcase, shopping bag, etc.) and/or a means of transportation in one compact and manageable unit, which will be just as acceptable to bring indoors as a wheeled briefcase.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a scooter embodiment of the invention.

5 Fig. 2 is a perspective view of a rigid stay as seen in Fig. 1.

Fig. 3 is a side view of the scooter in a position for personal transportation with the forces acting on the structure indicated.

10 Fig. 4 is a perspective view of a scooter embodiment being folded.

Fig. 5 is a perspective view of a scooter embodiment fully collapsed.

Fig. 6A shows a side view of the front wheel section of the scooter in closer detail.

15 Fig. 6B is an enlarged detail of the connections of the rigid stay of Fig. 6A.

Fig. 7A shows a rear view of the front part of the scooter of Fig. 1.

20 Fig. 7B shows a cross-section of the guide structure of Fig. 6B.

Fig. 8 shows a front view of the rear carriage.

Fig. 9 is a perspective view of the front part of the rear carriage.

25 Fig. 10 shows a perspective view of a user and the scooter in a folded position, utilized as a wheeled briefcase or the like.

Fig. 11 shows a perspective view of a user and the scooter carried as a backpack.

#### 30 DETAILED DESCRIPTION OF THE INVENTION

As shown in Fig. 1, the illustrated embodiment shows a scooter 5, comprising a rear carriage 1, comprising at least one platform and two rear wheels 7 moveably arranged to front struts 2 via a rigid  
35 connection 3. Front struts 2 are attached to a support

section 6 through which a steering bar 31 affixed to a steering handle 33 passes. At the end of bar 31, steerable front wheel 18 is mounted on an axle at the end of bar 31. Support section 6 is attached to a guide structure 4 to facilitate folding of the device. The front 8 of rear carriage 1 is slidably mounted on guide 4 as will be described in relation to Fig. 6A, 6B, below. The front wheel 18 might be turned through an angle of at least 180° and is fixed in a position in line or transverse to the rolling direction when the device is folded. The rear carriage 1 is further provided with a handle 20 near the front of the platform, which enables folding of the device by use of one hand.

The rear carriage 1 is designed generally as a U with two wheels 7 arranged at the rear ends of this U structure's arms.

As seen in Fig. 5, the rear portions 16 of the carriage 1 behind the rear wheels 7 is designed to support the scooter 5 in folded and upright position. These rear portions may act as platforms on which the device rests if tipped upright. In this position the scooter will not roll away. If the folded scooter is tilted backwards, the rear wheels 7 will be brought in contact with the ground at holes 17 and it can be wheeled as a wheeled briefcase or the like. Due to the scooter being tilted around a fixed point 16 on the rear carriage 1, this may be done by the use of one hand by applying a minimum moment of force.

The rear carriage 1 is connected to the front part of the tricycle via a rigid connection (stay) 3, which in the embodiment disclosed and shown in Fig. 2 comprises a metal rod bent in the shape of an U with a straight stay 11 and an outward bent section 10 at each of the free ends of the U. The rigid connection 3 is pivotally arranged to a mid-section of the carriage 1 and

to the lower part of the forward part 1, so that the carriage 1 can be folded towards the struts 2 when the forward portion of the rear carriage is lifted. As seen in Fig. 4 rigid connection 3 pivots at section 10 on carriage 1 while straight stay remains at a fixed translational position on the frame supporting the front wheel 18. Front 8 of carriage 1 moves along guide structure 4.

Further, the rear carriage 1 is slidably arranged in a guide 4, on the front part of the scooter, as shown in Fig. 6A, 6B. Two pegs 21 (see Fig. 8, 9) protruding towards each other engage slots 22 (shown in Fig. 7b) in guide 4. Generally, the guide 4 runs from the stop face 9 to a position located higher on the support device 6 and serves to guide carriage 1 in respect to the support device 6 when the scooter is collapsed or expanded.

The angle between the support device of the scooter and the ground is sharp to provide an enhanced stability during steering and when the front wheel is in a transverse position.

In the personal transport position, the front part of the carriage 1 abuts a stop face 9. The stop face 9 shown in Figs. 6A and 7A comprises an upper edge 14 and sloping edges A and B; the front part 8 of the carriage 1 is resting by abutment of corresponding facing sloping edges A and B on the stop face 9. The sloping edges A and B on the stop face 9 are designed at angles to avoid frictional jamming.

The contact points A-a and B-b (of surfaces shown in Fig. 7A with surfaces shown in Fig. 9) form a quadrangle which carries moment of force between the parts in the transversal plane. The open U-shaped area of the front portion 8 of the carriage 1 is guided over a transversal edge area 14 formed at the upper part of the

stop face 9 of the front portion. To ensure that the forces are transferred via the sloping edges A-a and B-b, the carriage 1 abuts the stop face 9 with a close fit in the horizontal direction and with a slight clearance  
5 vertically from the upper edge area 14. The upper edge area 14 is substantially carrying forces in the horizontal direction which are caused by opposite directed tensile forces in the rigid connection 3. Fig. 3 shows the forces in a triangle formed by the locating  
10 points x, y, z.

With reference to Fig. 10, the support device 1 may comprise compartment units 23, so that the scooter forms a wheeled briefcase or the like in a collapsed position. Further with reference to Fig. 11, the  
15 tricycle may be equipped with carrying strap 24 to carry it like a backpack or a bag. When collapsed front wheel 18 fits between rear wheels 7, bar 31 retracts into support device 6 (shown in Fig. 1).

The main parts of the vehicle are made of  
20 metal, plastic or other substantially rigid materials. As was illustrated in Fig. 1, the front wheel of the scooter is joined to a front wheel mount assembly. This assembly in the illustrated embodiment includes the support section 6, the steering bar 31 and steering  
25 handle 33, a guide 4, and a stop face 9. A front wheel mount will contain at least some of these elements. The front wheel mount assembly is joined to a carriage by a pivot stay which is attached to the carriage, for example to the midsection of the carriage such that the stay can  
30 pivot. For example, ends of the stay (the rigid connection 3) may be inserted into holes on the carriage such that the stay ends pivot when the carriage is raised. A second end of the stay (i.e. the rigid connection 3) is attached to the front wheel mount  
35 assembly such that it too may pivot. The carriage is

mounted such that it may fold in such a way that the rear wheels on the carriage are brought toward the front wheel, and the carriage pivots on the stay. When fully folded, the two rear wheels are at least partially  
5 between the front wheel, as shown in Fig. 5. The guide is a secondary structure for use in folding. Pins on the carriage fit into the guide, such that the carriage may be more easily folded against the front wheel mounted structure.

10 As shown in Fig. 1, the rear wheels are joined to the carriage such that the axles of these wheels are above the surface of the carriage riding platform. This adds to the stability of the device by allowing a riding platform that is lower to the ground. The section of the  
15 carriage surrounding the rear wheels exposes an area of the bottom of the wheel, for use in normal operation, and a section towards the top, for use in rolling the device when the carriage is folded against the wheel mount assembly. In addition, a section of the back of the  
20 wheel is enclosed to provide a surface onto which the device may rest when tipped upright. This feature makes the device stable when positioned as in Fig. 5.